The SSSA Fundamental Changes to Soil Taxonomy Task Force

Task Force wiki: http://casoilresource.lawr.ucdavis.edu/wiki/SoilTaxonomyTaskForce

Task Force Members

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John Galbraith, Virginia Tech	**Mickey Ransom**, Kansas State
Jonathan Hempel, retired NRCS	**Joey Shaw**, Auburn

Task Force Objective

Task force objective: to facilitate an open and transparent process to develop a suite of fundamental changes to Soil Taxonomy leading to a more user-friendly product that can and will be used by more than just trained soil scientists.

Guiding Principles

1. The fundamental changes in Soil Taxonomy should lead to a more user-friendly product that can and will be used by more than trained soil scientists. Broad input will be required from both the United States and international community.
2. The proposed changes should have minimal negative effects on existing National Cooperative Soil Survey (NCSS) mapping products (possible as long as the concepts for specifics series don't change, even if the family classifications of the series do change to better reflect these concepts).
3. The fundamental changes in Soil Taxonomy should complement the concepts used in other soil taxonomic systems (specifically the WRB).
4. Changes should consider the implications of serving the dual purposes of Soil Taxonomy as an applied system to assess the potential and limitations of the soil resource and as a classification system for the discipline of soil science.
5. The fundamental changes should improve Soil Taxonomy without losing the decades of knowledge embedded in the current system.
6. The end product of this process should be a single proposal that goes forward to the National Cooperative Soil Survey (NCSS) for approval. This will allow for consideration of the implications, benefits, and trade-offs of the complete suite of changes (although all changes may not be accepted by the NCSS). If accepted, these changes may lead to the publication of a 3rd edition of Soil Taxonomy.

Rationale

Soil Taxonomy is the dominant soil classification system in the United States and many other nations. As the system has developed and grown, it has become increasingly complex, resulting in a document that is difficult for non-trained soil scientists to apply. Thus, few other disciplines use the system to communicate soils information. The SSSA established the Fundamental Changes to Soil Taxonomy Task Force to address the growing number of issues with using and teaching Soil Taxonomy.

Process

- Generation and collection of proposed change ideas (full list available on Task Force wiki).
- Selection of priority proposed changes.
- Formation of committees to further develop priority changes. Committees include task force members and other scientists that have experience in the issue.
- Solicit as much input as possible from the national and international soil science community regarding the proposed changes.

Task Force Selected Proposed Change Ideas in Development (no proposals for changes have been made to date)

Reduce Complexity of Low Activity Diagnostic Horizon Recognition (Chaired by Joey Shaw)

The goal of this committee is to reduce complexity of low activity diagnostic horizon recognition (kandic and possibly oxic). Specifically:

1) Explore requirement that both CEC (≤ 16 cmol kg-1 clay) and ECEC (≤ 12 cmol kg-1 clay) criteria are necessary for horizon identification. For kandic horizons in the southeastern U.S., evidence suggests that most soils that meet CEC criteria also meet ECEC criteria. Possible proposals include the substitution of "or" for "and", or removal of ECEC criteria.
2) Explore harmonization of clay increase requirement for argillic and kandic horizon identification. For coarse textured eluvial and/or overlying horizons, the difference equates to a 3 vs 4% clay increase, respectively.

Fine, kaolinitic, thermic Typic Kanhapludult from the Central Alabama Piedmont

Progress: A committee and formal proposal is in development. Global input is essential considering the overlap between kandic and oxic horizon criteria and concepts.

Create an Official Series Description (OSD) database and Harmonize meanings across the hierarchy of Soil Taxonomy (Co-chaired by Dylan Beaudette and Brian Needelman)

A OSD database would have many uses, including:

- Allow for searches and automated changes.
- Allowing for the assessment of the impact of potential change ideas.
- Facilitate the process of harmonizing meanings across the hierarchy (a related committee). The lack of harmonization in Soil Taxonomy is a significant source of complexity and increases difficulty of use and learning.
- Clarification of mandatory criteria within OSDs for classification to the soil series level versus descriptive information about the series.
- Allow for integration of data-driven information into the current OSD, such as geographic context in the form of interactive maps, representation of relationships between soil series, and probabilistic representation of "most-likely" horizonation and range in characteristics.

Simplify the definition of the mollic definition (Chaired by John Galbraith)

The goals of this committee are to:

- Simplify and shorten the definition of the mollic epipedon
- Provide surrogate field data for current laboratory data requirements
- Move rarely used parts of the definition to the Key to Soil Orders

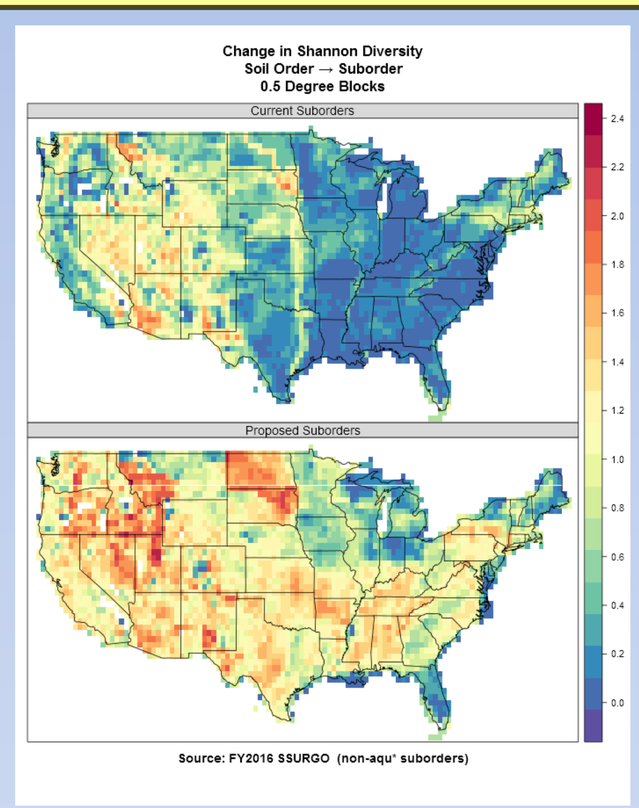
The following are examples of changes to the mollic definition under consideration:

- Has dominant color value and chroma ≤ 3 (when moist), and value ≤ 5 and chroma ≤ 3 (when dry). The dry color is waived in sandy horizons that are violently effervescent, and in finer textures that are strongly effervescent;
- Organic carbon content ≥ 0.6 percent. If a C horizon occurs in the profile, the organic carbon content is ≥ 0.6 percent higher than that of the C horizon;
- A base saturation (by NH_4OAc sum of bases) ≥ 50 percent; or a pH (in water) ≥ 6.0 if base saturation data are not available
- Thickness at least 18 cm if underlain directly by a densic, lithic, or paralithic contact; a petrocalcic horizon, or a duripan.

Create a new soil order for wet mineral soils and remove the soil moisture regime from the suborder

Committees on these two related changes are being formed and ideas are being developed.

- **Place all wet mineral soils in a new wet soil order**: Identifying the wettest soils is one of the most important uses of a soil classification system. Grouping all wet mineral soils into a separate order would be more in line with the WRB, where wet soils are placed in the reference soil groups Gleysols and Stagnosols.
- **Remove moisture regimes from the suborder (chaired by Toby O'Geen)**: Moving soil moisture regime information from the suborder to the family level would decrease complexity in the upper hierarchy of Soil Taxonomy and allow for more essential information at higher levels (see figure below). It was also be more in line with the WRB.



Changing definitions and criteria of soil organic materials and epipedons (Stolt – chair)

Preliminary draft proposals for consideration:

- Use only rubbed fiber content to identify decomposition classes of soil organic matter (removing pyrophosphate criterion)
- Use the terms sapric, hemic, and fibric to name decomposition classes of all organic soil materials regardless of if these are in mineral, organic, hydric, or upland soils.
- Use a single value of soil organic carbon content (e.g., 15%) to identify organic soil materials, regardless of clay content and saturation.
- Use a fixed depth for the minimum and maximum thickness of both histic and folistic epipedons (i.e. 20 to 40 cm).

Interested in participating on a subcommittee on a proposed change? Have comments to share with the Task Force? Please contact a member of the Task Force, Mark Stolt (mstolt@uri.edu), or Brian Needelman (bneed@umd.edu). For more information see:

- **Task Force wiki (includes full list of change ideas): http://casoilresource.lawr.ucdavis.edu/wiki/SoilTaxonomyTaskForce**
- **"Fundamental Changes in Soil Taxonomy" Symposium at 2014 SSSA meetings (oral presentations available online for SSSA members)**
- **Publication by Mark Stolt and Brian Needelman entitled "Fundamental Changes in Soil Taxonomy" SSSAJ 79:1001–1007.**